THE OPTICAL
MAGIC LANTERN
JOURNAL
AND
PHOTOGRAPHIC ENLARGER.

EDITED BY J. HAY TAYLOR.

Vol. 5.—No. 57. [Entered at Stationers' Hall] FEB. 1, 1894. Price One Penny.

CONTENTS.

	PAGE
Notes	21
Oxygen Works Wrecked	23
Are Lantern Stereotropes Possible	28
Home-made v. Commercial Lantern Plates	25
Skeleton Leaves for Lantern Slides	26
Twenty-five years' Experiments with Saturators..	27
To keep a Lime Jet firm	29
How to Enlarge with an ordinary Magic Lantern	29
The Optical System of a Lantern	30
Incident and Fact	33
About Gas Cylinders	36
New Apparatus, &c.	38
Patent Intelligence	40
Editorial Table	40
Correspondence	40
Notes and Queries	42
Just look on this, &c.	42

Notices.

THE *Optical Magic Lantern Journal and Photographic Enlarger* is issued on the 1st of every month, price One Penny, and may be obtained from all Newsvendors, Railway News Stalls, Photographic Dealers, or from the Publishers, at the following rates, post free:—

		United States.
12 months	2/-	60 cents.
Single copies	-/2	6 ,,

Advertisements (Scale of Charges), displayed:—

	£	s.	d.
Front and back pages, by arrangement.			
Ordinary page (whole)..	3	0	0
,, ,, (half)	1	15	0
,, ,, (quarter)	1	0	0
,, ,, (eighth)		10	0
,, ,, per 1 inch in column..		6	0
,, ,, ,, ½ ,, ,, ..		3	0

Special quotations for a series.

EXCHANGE Column, General Wants, &c. (not Trade)—First 20 words, 6d.; and for every 3 additional words, 1d.

ADVERTISEMENTS must reach the office not later than the 24th of each month. All cheques and postal orders to be made payable to Taylor Brothers.

EDITORIAL communications must be addressed, J. HAY TAYLOR. Advertisements and business communications to **Taylor Brothers, 56, Chancery Lane, London, W.C.**

American Agents:—The International News Co., 83 and 85, Duane Street, New York City.

NOTICE.

MANY CORRESPONDENTS STILL FORWARD THEIR COMMUNICATIONS TO THE OLD ADDRESS. WILL THEY PLEASE NOTE THAT OUR ADDRESS IS

56, CHANCERY LANE, LONDON, W.C.

Notes.

WE take this opportunity of reminding our readers that a discussion on Saturators will take place on Monday, 12th inst, at the Lantern Society, 20, Hanover Square. The meeting will be held at 8 p.m., and promises to be one of great interest as it will for the most part be of a conversational character. As stated in last issue, we intend showing a few forms of saturators in operation, and those who wish to exhibit any saturators will find plenty of oxygen at command. All are invited.

* * *

IN the course of a discussion at the Bradford Association, Mr. C. Wood, F.C.S., stated that he had found, when trying some experiments, that a gas-pipe that resisted a steady pressure of 100 lbs. to the inch, gave way when struck with a hammer at a pressure of 40 lbs.

* * *

IT has been estimated that to make 10,000 cubic feet of oxygen, every twenty-four hours. requires an expenditure in plant of £3,000, and for the labour and maintenance of the plant, nearly 2s. 6d. for every 1,000 feet of gas made.

* * *

ABOUT ninety gallons of oil, two yards of wick, and a score of chimney glasses are used annually at the Nore light.

* * *

IT appears that although electricity has been tried in several lighthouses for some time, oil is gradually regaining favour, as the light from the latter possesses a much greater penetrating power.

WHILE a labourer was engaged in opening a gas main at Dungannon, a terrible explosion of gas took place tearing the roadway up for about thirty yards. After due investigation it was decided that the ignition was caused by a spark from the pickaxe used in digging up the roadway.

* * *

A POSSIBLE method of utilising iron gas bottles for the lantern, in other ways than those now common, deserves investigation. When common gas is compressed it begins to split up into various hydrocarbons, and to deposit same in a solid state, but this is not the case with oil gas, which is why the latter is selected by Trinity House when it has to use, for lighthouse purposes, an illuminating gas under compression; moreover, the "Trinity brethren" recognise that such compressed gas gives a better light with concentric Argand burners, than does parraffin burnt from concentric wicks. This fact was published in these pages some time ago, and Mr. Fletcher, of Warrington, seems to have overlooked it, when he recommended paraffin as likely to give better results than gas in Argand burners. It would be useful to know what size of bottle, containing what pressure of oil gas, will do for a lantern entertainment of, say, three hours' duration, also whether there is any simple apparatus which could be placed near a lantern to make good oil gas as it is wanted, and consumed without putting the gas under abnormal pressure at all. Here is a field for invention and experiment.

* * *

WHEN in conversation with Mr. W. I. Chadwick, of Manchester, he stated that he had found the best covering for gas cylinders, with a view of preventing concussion, was to have a basket made on the cylinder. Some three years ago he had had a cylinder covered in this manner and found it highly efficient. To the best of his memory the cost was only 1s. 6d., or 2s.

* * *

As is well known to our readers, Mr. F. Brown, of Ossulston Street, N.W., is a maker of limelight jets, saturators, etc., but it appears that he has recently been enacting a new role, viz: burglar catching. Two burglars recently broke into his premises, when Mr. Brown with a little manœuvring managed to secure both until the arrival of the police. During the encounter he was fortunate in only sustaining a bite on the thumb.

* * *

ON another page will be found particulars of a clock slide which we learn was made by Mr. C. E. Rendle, whose articles on building a bi-unial lantern are at present appearing in our columns. We have had one of these slides sent to us and have tried it with great success.

* * *

THE two humorous advertisment slides which Messrs. Peek, Frean are offering to lanternists were from drawings made by Mr. F. F. Weeks.

* * *

As the use of oil lanterns and the necessity which exists for keeping developing rooms for lantern slide work warm in the winter will continually draw more and more attention to the proper combustion of petroleum, perhaps the following remarks will be useful. These little stoves with flat tin cone chimneys and a mica window, on sale everywhere at prices varying from about 2s. 6d. to 4s. 6d. each, display great ingenuity in construction, and are usually most efficient in supplying the right amount of air to burn the paraffin without smell, but they are not large enough to comfortably warm a room of decent size. In introducing two long burners into more costly stoves to obviate this, the manufacturers are confronted with a difficulty; they have either to make the ornamental upper part long and steeple-like to get a sufficient draught, in which case the stove is more liable to get knocked over, or they have to shorten that upper part, so that a slight smell is often given when the height of the flames is not carefully adjusted; in other cases they put additional metal work inside the stove and near the burners to properly govern the supply of air. Some new stoves are coming into use consisting of two of the good little stoves first mentioned, mounted upon one oil reservoir, and surmounted by one perforated metal headpiece for surporting cooking utensils or other things, close above the two flattened tin cones. This class of stove is excellent, for it enables anything to be rapidly heated, and when the stove is wanted solely for warming a room may be capped with a movable radiator. It also can be surmounted and surrounded above the reservoir by any ornamental movable open ironwork the possessor pleases, when such ornamental casings are introduced into the market.

* * *

After a thorough trial the electric lighting of the City has been pronounced a success and orders have been given to remove all the gas standards in the City, the cost of maintaining which, has cost nearly £1,200 a year. Out of 1,230 hours of electric lighting there was only a failure of one hour and the cost of gas to supply this deficit was only a few shillings.

* * *

The *Pall Mall Gazette* states that "The Arcadian age has returned, and childish simplicity has found a shrine at the Bachelors' Club.

There of a chill night Mr. William Gillett lectures prettily with magic lantern illustrations to a select circle of guests called from the ranks of fashionable London. He recounts his travels in India, China, Japan, and elsewhere for two hours and a half at a stretch, and ambassadors, smart ladies, and literary lions applaud with the eager delight of juvenile enthusiasm. Afterwards the grown-up children are taken down to supper and sent home in charge of their respective servants.

* * *

THE delivery of illustrated sermons on Sundays is part of a recently-adopted policy. What would be condemned, and was condemned, a few years ago, says the *Echo* is advocated and adopted now. The attendants of churches and chapels are beginning to use every-day secular agencies in order to maintain their ground; and by the time the present century will have run out it is not unlikely that concerts—sacred concerts of course—will be held first in chapels on Sundays, and afterwards in churches. Separate secular activities from churches, and they would soon recede in the background and lose their footing in the world.

* * *

MR. W. I. CHADWICK gave interesting demonstrations of the value of triple over double condensers in London about ten days ago. He explained that it was no use to give a long lecture upon the subject when an ocular demonstration would answer the purpose and take up less time. He thereupon in a few minutes showed the two in practice upon the screen and left his audience to draw their own conclusions by seeing the brightness of the light obtained by the former over the latter. Mr. Chadwick also exhibited a compact attachment which answered as a direct projector, vertical attachment and polariscope in one, the changes from one to the other being made in a few seconds.

* * *

PRIZES to the value of £5 will be given by Mr. Wm. Tylar, High Street, Aston, Birmingham, for the best sets of six lantern slides on the Hill-Norris lantern plates. The prizes are, 1st, £3; 2nd, £1 10s.; 3rd, 10s. Those intending to compete should lose no time in sending for particulars.

* * *

MR. J. ANDERTON's lantern for stereoscopic projection is creating great interest in Bristol where it is at present being demonstrated by Messrs. Dunscombe and Son.

Oxygen Works Wrecked.

THAT accidents happen in threes is a common saying. First we had to chronicle the sad affair in connection with the cylinder explosion at Bradford, then we mentioned one of a similar character at Albany N.Y., U.S.A., and now we have to speak of one that happened on 4th ult. at the premises of the New York Oxygen Co. It appears that several cylinders were screwed to the hydrogen pump being filled, and as soon as the pressure reached 2,000 lbs. it was the duty of the person attending the cocks to turn them off. It is inferred that the taps were not turned off when the requisite pressure was reached, for one tube or cylinder blew off from its connection with great force, striking an attendant with such force as to disembowel him. A second cylinder flew upwards, tearing a hole in the roof, which was made of sheet-iron, and was conveyed to an adjoining street. A third tube blew off, and fell with its side shattered. Two other assistants were severely injured, and were conveyed to the hospital. Great havoc was created on the premises, people were blown about, clerks knocked off their stools, and partitions torn down.

In the course of an investigation Mr. Burr, the secretary to the company, said:—"I do not think one of the tubes could have been defective, for we have them very carefully tested before they are fitted. We do not use the same tubes for hydrogen and oxygen, and no mistake could have been made this way, because the screw on one is on the inside and the other is on the outside. I can account for the accident only by believing that someone was careless, and I hate to think that. This is the first accident that has occurred in our factory."

——:o:——

Are Lantern Stereotropes Possible?

EVERY new advance in any branch of science forms but a stepping stone to additional discoveries; the pioneers of science extend their researches into previously unknown realms of thought, to but bring dimly into view a new and more distant horizon. Just so is it with Mr. Anderton's recent improvement in stereoscopic optical projection, bringing it within the domain of practical lantern work, for it has rendered possible the raising of the question—mooted for the first time, so far as we know, in a recent number of this journal—whether apparent motion cannot be given to lantern stereoscopic projections.

The construction of stereotropes, or instruments for giving apparent motion to the objects pictured on ordinary stereoscopic slides, is not new, but the subject has died out of public memory for almost thirty years, and the interest in its revival at the present moment consists in the raising of the question whether inventors will hereafter succeed in making the principle available for use with the magic lantern. A little is therefore appended about some of these curious old instruments, a description of which will probably come as a revelation to some lanternists, who are members of the rising generation.

In the supplement to *The Philosophical Magazine* for 1861, vol. 22, fourth series, page 537, is a description of a stereotrope exhibited at a meeting of the Royal Society, January 10th, 1861, by Mr. W. J. Shaw. The inventor took eight stereoscopic pictures of an object, say a steam engine, the pictures representing the successive positions it takes in completing one revolution of the fly-wheel, and mounted them upon an octagonal drum, which revolved upon a horizontal axis; the stereograms were then viewed through an ordinary lenticular stereoscope as they came one by one into view. Immediately beneath the lenses, and with its axis situated half an inch from the plane of sight, was fixed a solid cylinder, four inches in diameter, capable of being moved freely on its axis. This eye-cylinder was pierced through its entire length by two aperatures, so that a transverse section of the cylinder shows them as cones, with their apices pointing in opposite directions, and with their axes parallel to, and distant half an inch from the diameter of the cylinder. In the middle of each of these conical holes was a diaphragm. The eye-cylinder and the picture drum were so geared together, that the former made four revolutions to each single revolution of the latter. The effect of this was, that only eight times in a revolution of the drum could a stereogram be seen, and then, by means of persistence of vision, the machine in the picture seemed to be at work. Mention is made at the end of the article of another stereotrope, not described, in which use is made of the reflecting stereoscope. There is nothing about Mr. Shaw's paper in *Philosophical Transactions* for 1861, but something about it in *The Proceedings of the Royal Society* for that year, from which it appears that Mr. Shaw's memoir was communicated to the Royal Society by Mr. Warren De La Rue, and the remark is made, that in stereotropes, Wheatstone's reflecting stereoscope is "better adapted for the exhibition of movements that are not only local but progressive in space." There are no diagrams of the instrument, and to give clear ideas to the readers, written descriptions of mechanical appliances should always be accompanied by simple drawings to explain the principles of construction.

The era of stereotropes was a short one, which lasted only for a few years before and after 1860. Duboscq, the celebrated optician of Paris, invented one of them, but we have not yet been able to find a full description of his instrument. His papers on optical instruments were sometimes accepted by the Academy of Sciences, but a description of his stereotrope is not among the number. In 1859, a German book on the stereoscope was published in Quedlinberg, and included some new stereoscopic instrument by Duboscq, but we have not yet been able to see a copy of the work, so that all about it at present accessible to us is contained in a paper read in 1865 before the British Association in Birmingham, by Mr. Claudet, in which the latter says of stereotrope inventors: "He (Duboscq) had fixed two series of binocular photographs upon two zones of the revolving disc of the phenakitiscope, one above the other, and by means of two small mirrors, placed each respectively at the inclination capable of reflecting the two zones on the same horizontal line, whence the images could each separately meet the axes of each of the two prismatic lenses of the stereoscope, each eye, during the revolution of the disc, had separately the perception of one of the series of photographs, each showing the perspective of one eye, and the stereoscopic effect of figures in motion was consequent." Claudet goes on to state that M. Ducoscq gave likewise another form to the instrument. Instead of the vertical revolving disc, he used a cylinder revolving on its vertical axis, and he placed on two inside zones of that cylinder, one above the other, the two series of photographic pictures, and two slits through which the eyes could see the pictures; and by means of two mirrors, as in the other apparatus, each series was reflected on its respective lens through the cylinder, thus giving the effect of motion to the object represented in the stereogram.

Claudet stated that the defect of one of these arrangements was, the two series of pictures did not move with the same velocity, as they moved in two circles of different diameter, thus introducing a certain amount of distortion. With the revolving cylinder the defect did not occur, but the pictures were considerably curved, like the cylinder, which was unfavourable to their inspection in the stereoscope.

Claudet stated that he himself had tried to solve the problem, but so far the results were imperfect.

In *The British Journal of Photography* for 1865 is a diagram and description of a stereoscope, invented some years previously by Mr. Colman Sellers, and the accompanying simplified diagram, Fig. 1, will serve to explain the construction. An axis, carrying six vanes, was made to rotate inside a double drum; the stereograms were fixed at the places marked A, and were viewed through the stereoscope K. Outside these wings, or vanes, was a circular band of tin, not represented in the diagram, in which band slits were cut at intervals, and through the slits the pictures could be seen at the proper moments, to give the appearance of motion to the object, as in the ordinary thaumatrope or "wonder worker." Thaumatrope seems to be the best of the names of the ordinary instrument, which has several *aliases*, such as phantasmacope, phenakistiscope, and so on.

With single pictures, Anschutz of Lissa has recently produced fine lantern thaumascopic effects by mounting the slides on the circumference of a large revolving disc, and illuminating each one with a brilliant electric discharge whenever the slide reached its proper place between the condenser and the projection lens. Possibly there are no great difficulties in mounting stereoscopic slides in the same way, and illuminating them by a flash of light at the proper moment; the flashes perhaps might be given by the lime or other lantern light, by means of a second revolving wheel, pierced with holes at the proper places. A fault in some English and American thaumatropic lantern displays has been, that the pictures have been too few in number to pleasingly represent a given motion. Anschutz has avoided this defect, so that delicate undulating motions of the muscles and hairs of animals have been smoothly represented.

In taking photographs for the stereoscope, the distance apart of the lenses should depend upon the distance from the camera of the nearest somewhat prominent object in the foreground. If then a camera were placed on the side of a mountain valley, with no foreground within one or two miles, and that a village perched on the opposite side of the valley, what is the best way to get stereoscopic effect? The late Mr. Donkin, who lost his life in the exploration of the Caucasus, used simply to take two negatives with an ordinary camera, suitably shifting the position of the stand between each. Many will remember Mr. Latimer Clark's early stereoscopic camera, in which the camera was made to slide along a board, so that one view could be taken from one end of the board, and the other from the other end. Not so many perhaps have heard of the instrument devised by Helmholtz to gain a stereoscopic effect in viewing distant objects, by an optical arrangement yielding the same results as if the eyes were farther apart—say a yard apart—and the principle of which instrument apparently might be modified and adapted to taking binocular views with twin telephotographic lenses. Fig. 2 will explain the principle. Let KK be two reflecting plane mirrors, and A a prism; the eyes of the observer, WW, will then see a distant object, as if his eyes were, say, a yard apart, at HH, and looking in the direction HN. A photographic adaption of this principle then, might perhaps be devised to get stereoscopic views of distant objects for the lantern stereotrope, or other purpose required.

While dealing with these curious old instruments, it may be as well to draw attention to the modification of the stereoscope devised by Clerk Maxwell, and brought by him under the notice of the British Association at Dundee, in 1867. It consisted of a baseboard, ABC, about two feet long, with an ordinary stereoscopic picture, A, at one end, and two small twin lenses at B; these lenses were each of six inches focal length, and their centres about one and a quarter inch apart; their support had a sliding motion along the board for adjustment. At C was a frame carrying a lens three inches in diameter, and of about eight inches focal length. The effect is that the observer sees a real instead of a virtual optical image, looking like a real object in the air close to the large lens.

—:o:—

Home made *v.* Commercial Lantern Plates.

By Lewis Medland.

Mr. Clifton in his article on the Hill-Norris plate states, "that even the most devoted advocates of the collodio-bromide process have, almost without exception, dropped it in favour of commercial gelatine plates." A few words from an "exception" may prove of some interest.

There are three principal reasons why this "process" has been deserted by so many, viz.. the difficulty of procuring a suitable sample of pyroxiline, a reasonable quantity of methylated spirit (free from mineral naptha), and the trouble attached to the manufacture of the emulsion.

The first-named, I must confess, has been a source of great anxiety to me, but this has now been overcome by using "Celloidine" shavings, which I have found uniform in quality, making a rich emulsion. As to the methylated spirit, after much research and enquiries at headquarters I found that a permit would be granted for five gallons annually. It was much more than I required, but I decided to get it, the cost being 2s. 2d. per gallon. Then as to the trouble, this is more fancied than real, as the aggregate periods of time expended on the emulsion from beginning to end does not exceed twenty-minutes, at other times it is at rest, washing, drying, and re-dissolving.

Residing as I do, in the suburbs, where lantern slides are practically unknown. What is easier than to shake up my bottle of emulsion, and after a short time coat a dozen plates, fetch some boiling water and place it in the lower receptacle of a double baking tin, on the upper, the plates. Then, in less than five minutes you can make your slides. All this can be done in abundance of non-actinic light, by which you can read a book quite comfortably.

I do not know how the Hill-Norris glasses are prepared previous to coating, but I find a glass properly dusted with powdered talc and afterwards edged with a *very thin* solution of india-rubber, will stand far more heat than you can yourself.

Whilst developing slides during the late frost when the water was frozen in the dark room, I used two deep dishes filled with boiling water, one to wash the plate in before, and the other after development. My alkali bottle stood in the fender and was so hot at times that I could not handle it without a cloth, and on one occasion cracked a measure, yet with "dry pyro" I developed satisfactorily as to colour and without a film slipping. When fixed, the slides soaked in warm water until I had finished the required number, and then a good rinse under the hot water tap and a final toast by the fire completed the business. Where would the gelatine plate be under the same circumstances? I am not writing this, Mr. Editor, in order to run down any commercial collodio bromide or gelatine plate, from which the most magnificient results have been obtained as witness those shown so recently at the "Central" lectures. I am only upholding in a mild way that process which chiefly commends itself to earnest amateurs who like to make their own lantern plates at a very trifling cost.

Gas Cylinders on Passenger Trains.—The Railway Companies have just withdrawn their restriction with regard to above, and will now take cylinders in passenger trains if they be encased in baskets or boxes.

Skeleton Leaves for Lantern Slides.

By Edwin D. Bartlett.

Whilst I was overhauling my odds and ends the other day for something of interest to show my friends with the lantern, I came across some skeleton leaves I had made years ago. I thought I would see how they looked when thrown upon the screen, and I was quite surprised at the beautiful effect they produced. The skeleton leaves having been kept between the pages of a book they were perfectly flat. I selected a suitable mask and bound them between two cover glasses in the same way that one would bind an ordinary lantern slide.

These skeleton leaves can be often found in damp forests, but they can also be made artificially from the leaf picked green from the tree. To prepare the skeleton leaves artificially they should be macerated in water (rain water) in a warm place. A developing dish is a suitable vessel for the purpose. Let them remain till putrefactive fermentation takes place, when the soft parts are easily separated from the fibrous by washing in fresh water, blowing on them with a pair of bellows, and then gently pouring a small stream of water from a narrow spout upon them. Care must be taken to remove every particle of the soft parts with a fine needle or camel-hair pencil, after which, first wash the skeleton leaves in fresh water, then with a weak solution of chloride of lime and expose on stout paper under a wire cover in the sun to bleach. When white enough they must be washed with dilute hydrochloric acid (one to sixty parts of water), dried and mounted. Leaves can also be skeletonised by burying in a box of damp sand or in very light soil.

A number of slides of carefully selected leaves prepared in this way would be of great help for a teacher to illustrate the structure of the leaves for botanical classes.

——:o:——

Optimus 100 Guinea Competition, '93.—The winners of this competition have had their respective prizes awarded by Messrs. Perken, Son & Rayment. Those who are mostly interested are J. H. Avery, W. Galloway, J. C. Oliver, J. Vickers, Geo. Reade, Mrs. S. F. Clarke, Miss C. R. Marcus, A. F. Jarvis, A. T. Bushnall, J. W. Morgan, T. G. Jamlin, B. Laverach, J. H. Gear, E. Brightman.—We have seen many of the prize pictures which reflect great credit both on the users and makers of the apparatus.

Photomnibus Competition.—The prize winners of the fourth Photomnibus Competition, are as follows:—H. J. Robinson, Lewis, £2 2s.; Miss E. E. Williams, High Wycombe, £1 1s.; Miss R. Bell, Edinburgh, 10s. 6d. Particulars of the fifth competition, which closes June 30th., can be obtained from Mr. Wormald, of New Malden, S.W.

Twenty-five Years' Experiments with Saturators.

By Thomas Timberlake.

Some time since I promised to give you some particulars of the above. I now intend to redeem that promise, if possible.

Having been a lanternist from my youth up; the first idea of making a saturator was suggested to my youthful mind when benzoline was being "boomed" as *the* light of the future, by seeing the lamps with a plate of brass on top, and four small holes in the side of the tube carrying the wick, which, when lighted gave four jets of flame as the light.

At that time we could not buy oxygen commercially, it had to be made, and the process of making it rendered my father somewhat uneasy as to its safety, so I took to saturating coal-gas, in the first place (to burn in my lantern).

I constructed my first saturator out of a 1 lb. coffee canister, and with the aid of some of mother's crinoline steel and an old blanket, I made seven diaphragms of old blanket, and put these tightly inside the canister, filling the interstices with fine beech shavings, leaving a small space at either end empty. I then soldered the ends on, and soldered a brass filler in the middle of the canister, and fitted a tube into either end, through which coal gas passed, being enriched by the hydro-carbon vapour from the benzoline with which the canister had been previously filled about one-third full. I then tried to burn it through an ordinary gas jet. The light was an improvement on my old Argand burner and colza oil, but nothing like the limelight, and it made the lantern excessively hot. So I fell to with the oxygen again, and if there was danger before, it increased now. I had served five years at a chemist's shop, and I myself knew the danger of the resultant compound gas. But beyond a few pops like crackers nothing very bad happened; but I could not get a good light for long after the lighter portion had been evaporated, and burnt. The remainder refused to give off enough vapour, and generally went out with a series of firework pops, rather startling to any onlooker, and not very reassuring to myself, so for some time I gave it up as a bad job.

Some time after I had an idea that if it could be warmed it would improve it. So I dipped a cloth in hot water and rolled round my canister, so as to warm it, and found that for some time it was much better, but the liquid condensed in the pipes and spluttered on the hot lime in fits and starts, so that the jet soon became covered with liquid benzoline, which produced a flare up. This I remedied by shortening and covering the pipes, but as soon as the wet cloth got cold, it was pipity, pop, till it popped right out. I found more vapour was required, and made numberless saturators to try and get over this apparent defect. Recollect, all this time I was trying benzoline of the ordinary oil-shop quality, which varies very much in its vaporizing quality.

Success seemed a long way off, so for several years I left off experimenting, and studied the subject of gases and volatile hydro-carbons, and came to the conclusion that it was to be done if I could get a benzoline of superior quality. I tried this and it was a great improvement, but the condensation still hindered me from obtaining good results. I tried methylated spirits and ether: the latter worked well while warm, and but for the pops seemed alright, but occasionally the lime was deluged by a spray of ether unvapourised. So I set to work and made a saturator with five compartments, these were filled with cotton wool kept from sagging by discs of wire gauze soldered inside, and I did not put so much liquid in. The result was very encouraging though it did need a lot more weight on the gas bag. My next move was to attempt to keep the saturator hot; and after various methods of hot bricks, hot water, &c., had been tried, I came to the conclusion that I must get more warmth to the saturator, and warmth that would not vary; so I arranged a tin cover, viz.:—

An oval tin boiler set sideways with the saturator suspended in the top, a line of holes in the bottom, and the lid pushing in sideways. There were four legs soldered on to keep it from rolling. I placed inside the reservoir my bicycle lamp, burning colza oil. This, I was afraid would heat the part of saturator nearest the flame too much, so I put in a shield just at the bottom, and about a quarter of an inch from the saturator. This seemed to do very well, and I could manage an exhibition with a pop at the commencement and another at the finish. So I tried to improve the saturator by introducing into the centre a pierced tube from which the oxygen should spread through the stuffing. It was so far successful that I thought I might venture to use it in public, for although the light was somewhat unsteady it was very brilliant. Arrangements having been made, I got my operator to practice with it. It was an intensely cold night, several degrees below zero, and we could not get it to work quite so satisfactory as it had done; a few pops and a flare up quite frightening my operator.

We were now able to get compressed oxygen, and I ordered a cylinder, and after a private trial, I thought we could venture with that, especially as we had got a new lantern, and a three-wick paraffin lamp with us in case of emergency. My former schoolmaster was to take the chair, and the lecture was to take place in the Town Hall of my native town.

The eventful night arrived, and the reporter, an old friend of mine, was present to witness the exhibition and examine the new apparatus, and I very minutely explained to him the whole affair.

The show commenced, and we had got over the first part of the programme with a splendid light, and in the interval I had congratulated my operator on his management of the apparatus. However, the lights were turned on for some singing during the interval, after which, when about to re-start, and had lowered the lights, there was a loud report as from a rifle, and out went our light. My chairman at once rose and apoligised to the audience, and assured them there was no danger, consequently not a person moved, and to my surprise the audience were quite calm and seemed to take it as a joke. The chairman occupied some time in explaining the nature of the gas, impressing on the audience the fact that I did not allow the gas to mix till near the burning point at the nipple.

We then had some more singing, and I went to see what was the matter. I found my operator had somehow or other turned the tap off suddenly, thus causing the pop and bursting the saturator, but no fire appeared to have touched it, but while we were looking about and considering what to do, all our oxygen escaped from the cylinder, and we finished that lecture with the paraffin lamp; and all that kind reporter said in his report of the lecture was that "it showed the vast superiority of the new light in comparison with the oil lamp." After this episode, I left saturators severely alone for some time.

As time went on I had more calls for my services with the lantern from country places, and the spirit jets were occasionally very annoying, and compressed gas too dear, and my thoughts would revert to the splendid light of that memorable evening, and I longed for a saturator once more. I had seen several advertised for sale. I wrote for particulars of one; they gave glowing accounts of its merits, and a second-hand one was at length sent me for trial with option of purchase.

I studied the instructions minutely (it was a cold saturator) and on the following Saturday afternoon, when my employes had left, I took it down into the works office, and had a cylinder of oxygen ready, sent to the chemist for a pint of ether, and found his entire stock consisted of 12 oz., which he sent me, charging 3s. 10d. I put the correct charge in the saturator, and turned on light to warm up the lime. Gradually the light began to assume the colour that I knew was dangerous, and I shut down for a short time, then lighted up again, and had turned on the pure oxygen supply about two minutes, when bang! went the whole affair with a report that shook the place, and scattered fiery fragments all over the office. But nothing had touched me, and it did not even break the windows. I turned off the oxygen at cylinder and had a lively time for the next few minutes, extinguishing the flaming wicks which had (with sawdust) composed the interior of the saturator.

I sent the pieces back to the gentleman whose property it was, with an explanation, and asked him the cause. He was unable to tell me, and from that time till now I have never been able to fathom the cause. We amicably arranged the matter. The owner having the pieces, and I paying him half the price agreed upon in the first place. I made up my mind not to be baulked, but to try again with an instrument of my own design upon the lines of the old tin one. I got a friendly coppersmith to make me a very strong one, well stayed, the interior of which was arranged to my peculiar fancy. This I fixed up in the old boiler, and heated with the colza lamp, using it for a long time with varying degrees of success and without mishap.

Some years after this I was startled to see the specifications of a certain patented saturator which embraced nearly every idea I had combined in mine. I had used it on and off for many years. I at once wrote to the patentee and told him how I had been using a similar apparatus, offering to send him the identical one for his inspection. He wrote me a very nice reply and said he would place the matter before his patent agent, but did not think it would interfere with his patent, as it was the case of a genuine invention which he had patented and I had not, I began to turn my attention to something different, and devised about a dozen different sorts of saturators, several to be self-heating in the lantern itself. Many of these were successful, but as I wished for a perfect one, I continued experimenting, and was getting somewhere near the mark when one appeared which partook of many of the points I had already adopted, and used both in public and private.

That saturators will be more used than ever

I quite believe. That perfection is not yet achieved I must also admit, but that saturators *can* be used with as much safety as any other form of limelight I am positive. From my last four years' experience, during which I have had no mishap whatever, and with as brilliant results, if not better than can be obtained with the best jet made, and oxygen and hydrogen gas used in the usual way. I regret that I cannot fully explain my latest saturator as I intend to patent this, but hope shortly to introduce it to your notice. I send herewith to the Editor (Mr. J. Hay Taylor) a few of the saturators I have made at various times, with short description attached to each. They are out of date now, but if he thinks well to try either or describe them he is at perfect liberty to do so.

The wording of Messrs. Morgan's letter in December issue is very objectionable, as they may have the same experience that I have had, and find two different inventors sometimes invent the same article and use it in public without the knowledge of the other, and never having seen each others productions they prove as much alike as two peas in a pod, and without copying.

At some future date I may give you my opinion on the management of saturators. Let me say in conclusion that there is no danger with any well-made saturator that is fully stuffed, if used with ordinary caution (not fear, which leads to mistakes), and ether of a specific gravity of from 0·717 to 0·917. The main points, I find, must be rapid evaporation and saturation of the oxygen with ether or other hydrocarbon. I have never been able to get saturators in the lantern too hot. I find that the hotter they are the better they work.

(Mr. Timberlake has sent some saturators to our office, where they can be seen by anyone interested. We shall show them at the Lantern Society on the 12th inst.—Editor.)

:o:

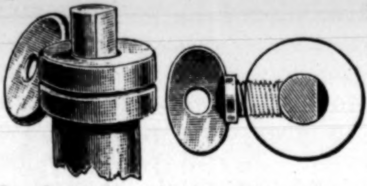
To Keep a Lime Jet Firm.

By C. F. Williams.

To fasten a jet on its upright rod by means of the clamping screw provided for the purpose would at first sight appear to be a simple matter, but for all that, one often experiences difficulty in preventing the jet slipping down on the rod by reason of the clamping screw not holding sufficiently well or else because the rod happens to be little out of the round when the slightest side movement of the jet causes it to slip.

Some time ago, I came across a good and simple method of preventing this, in some articles by Mr. Samuel Highley F.G.S. It simply consists in filing away the front portion of the tray-rod so as to leave two sharp edges. These edges bite the inner surface of the clamping tube and thus prevent slipping either sideways or downwards. Anyone possessed of a file, a few minutes of spare time, and a little common sense, can quickly adapt his jet so that it will be held firmly.

The accompanying sketch will make the matter quite clear. The front surface of the rod after filing should be quite flat and the edges clean and sharp. When the jet is clamped to a rod of this nature it will be found to hold with great rigidity.



:o:

How to Enlarge with an Ordinary Magic Lantern.

By the Doctor.

So many possessors of a standard-sized lantern, that is to say with condensers $3\frac{1}{2}$ or better still 4 inches in diameter, are also photographers, that a few hints on utilising their lanterns for enlarging may not come amiss. At first sight it will probably appear, especially to those who have not tried it, to be a very simple matter. Nevertheless, several unsuccessful attempts have come to the writer's notice and he set himself the task of practically overcoming the various difficulties. It will be advisable in the first place to make a special wooden block or carrier to protect the negative when placing it in the stage, as the ordinary carriers are of course incapable of holding anything over $3\frac{1}{4}$ in. square, and the negative being unprotected by a cover glass is very liable to be scratched if inserted by itself. Where the stage has an open top, portions of quite large negatives—say whole-plate or 10 × 8 may be enlarged from, while all lanterns will take a quarter-plate, and nearly all a 5 × 4. If the stage will only just admit the width of the negative without any frame, the plate may be protected by a very thin clear cover glass fastened on by two or three morsels of gummed paper at the corners. Care must also be taken that the negative is securely held so that no movement can take place while the exposure is going on. If the ordinary springs are too weak to do this, a slip of thin wood may be inserted at each side to give the necessary pressure. The negative should of course be placed so that the film side is turned towards the objective or front lens of the lantern. If a Kodak or other flexible negative be used it should be sandwiched between two pieces of glass tightly bound together with a gummed strip in the ordinary way, for unless this precaution be taken the heat of the lantern will cause the film to curl, rendering focussing difficult, besides sometimes giving rise to slight movement during the actual exposure and precluding the possibility of obtaining a sharp picture.

Having the negative placed in position and the lamp lighted, the next proceeding is to ascertain whether the focussing arrangement will permit the lens to be removed far enough from the negative to give only a moderate degree of enlargement. It will probably be found that it is impossible to obtain a smaller disc than 20 to 24 inches and it is therefore necessary to provide a tin lengthening tube, to be inserted between the two tin or brass draw tubes that carry the lens flange ; one half of this extra tube must be made of a double thickness of tin so that it will go inside one of the original draw tubes and outside the other. It should be nicely fitted so as to allow of free movement, but without shake. If the equivalent focus of the lens be unknown it should be determined by the method described by Mr. Goodwin Norton in the last number of this Journal, as this will be found to be a great help in deciding what length to have the supplementary tube, and will also save time in arranging the relative distances of the negative, the lens, and the board supporting the sensitive paper or plate.

So far we have presumed that the objective of the lantern is corrected for photography, that is to say, if the image appear sharply upon the card or paper used as a focussing screen that the resulting enlargement will appear equally sharp. Now although most lanterns are provided with portrait combinations as objectives, many of the higher class instruments have specially constructed lenses which are designed for the purpose or projection only, and which are not, from the photographers' point of view, properly achromatised.

The photographer can, however, always resort to the lens with which he took the original negative, provided that the same be of a moderately short focus, and it will in many respects be found the best possible tool for the purpose, for it will tend to remedy any distortion which it may have caused in the negative, this being particularly true when a single landscape lens is in question. Any turner will make a disc of hard wood to serve as an adapter to screw the photographic lens into the lantern flange. For experimental purposes a bung with a carefully centred aperture in it will answer well ; although a wooden or metal adapter should be provided for regular work. The operator should, before having the lengthening tube made, decide what lens he intends to employ, as upon this the length of such tube mainly depends. A good rule is to make the *greatest* available distance between the optical centre of the lens and the surface of the negative double the equivalent focus of the former. This will permit of the projected picture being made of the same dimensions as the original negative or as much larger as may be desired. For great amplification the middle tube may be dispensed with and the original draw tube used alone.

The last point to be noted is a very important one ; it is the cutting off of the stray light which finds its way out of about fifty apertures, large and small, in the average lantern. No ray of this must reach the sensitive surface and yet the ventilation of the lantern must not be interfered with. This appears to be rather a "large order" but is in reality a very simple matter, as it can be effected by enclosing the lantern in a three-leaf screen or clotheshorse covered with dark curtains, a small opening being made for the lens to peep through, while a piece of blackened tin or ferrotype plate, 8 or 10 inches square, fixed upon the usual hood of the chimney will effectually prevent any rays from reaching the ceiling. If it be desired to construct a special screen, a hint may well be borrowed from the unknown architect of the earliest dramatic edifice—the Punch and Judy Show.

—:o:—

The Optical System of a Lantern.

By A. M. Hiddon.

In bygone days, when the optical lantern was but a toy, an accurate knowledge of the why and wherefore of its various parts was superfluous ; but nowadays, when it has been elaborated into a delicate piece of highly scientific apparatus, demanding a considerable amount of technical knowledge for its proper manipulation and management, and when perfection of results is only to be obtained by a careful consideration of, and attention to, every detail, the theory of its action can no longer be utterly disregarded. In the earlier forms the lantern and its parts were more or less incapable of adjustment, and the results obtained from it depended entirely upon the skill and care lavished upon its construction and fitting; but in later and more modern patterns much depends upon the personal skill of the operator.

Many of the recent improvements, although very valuable in themselves, are possessed of this drawback:—they have made the lantern more complicated, and, while giving an increased command over the apparatus, have by no means simplified the working of it. Under these circumstances some acquaintance with the optical system of the lantern is not only desirable, but is absolutely necessary for those who are anxious to do justice to such an intricate and delicate instrument as a high-class lantern has become. Anyone who is really master of his apparatus who not only can produce from it the very utmost it is capable of, but who also has, so to speak, a reserve fund of knowledge wherewith to meet and combat possible breakdowns on the spot, will take more pleasure in its use, and derive more satisfaction from the display of its qualities. In the following article an attempt will be made to explain, for the benefit of the inexperienced, in a simple, and so far as the subject will allow, in a non-technical fashion, the work performed by the various lenses which form the essential parts of a lantern. The subject is not, perhaps, a very interesting one, but the actual benefit to be derived even from a rudimentary knowledge of the properties and capabilities of the different optical parts amply repay one for the outlay of time expended on it.

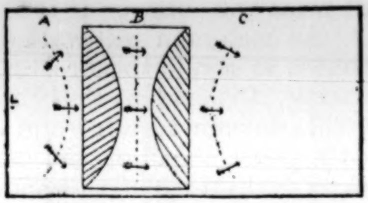
The result which an ordinary convex lens, that is to say, a lens which is thickest in the centre, has upon rays of light is, as is well known, to converge them to a point; while, on the other hand with a lens with concave surfaces, the light is diverged and spread. Why this should happen can be popularly explained by means of the followng particularly unscientific illustration.

Imagine a number of soldiers, linked arm in arm, advancing forward in a line at, say, four miles an hour. The men shall represent a wave of light emitted from a luminant such as the lime light. Now, if an oval-shaped pond of shallow water be interposed in the line of march, let us consider what will happen. As the line of men enter the water, owing to the increased density of the medium through which they are marching, their pace will be checked to, perhaps, one mile an hour. The pond being somewhat oval in shape (or as we should say in speaking of the section of a lens — by-convex) it will result that the centre portion of the line will have a greater distance to travel through this denser medium, and that consequently this centre portion will be most retarded, and will be still wading in water at one mile an hour when the two ends of the line have already passed through the narrower extremities of the pond. Remembering that the men are supposed to be linked arm-in-arm, it will be seen that when the whole line has issued from the water, it will be more or less semicircular according to the width of the pond. But what will happen if the march be continued? As each man will walk straight to his front, that is to say, in the direction in which he is now facing, it is evident that the two ends of the line will converge together and eventually will meet at a point ahead of and midway between them; the distance of this point depending on the amount of curvature of the line on leaving the water, or, what comes to the same thing, the curvature of the pond. If the pond, instead of being bi-convex in shape were plano-convex, that is to say, one bank straight and the other curved, the line of men on issuing would be less curved and more nearly approaching a straight line, and consequently the point at which the men would meet would be further off.

This illustration of a lens' action is, perhaps, rather childish, and, of course, inaccurate, but by looking at a lens in this light, and by regarding the glass of which it is formed, merely as a denser medium which retards to a greater or lesser degree according to its thickness, the ray of light which passes through it, we are able to roughly guess, off-hand, what the action of any given lens, or combination of lenses, will be.

We shall now be in a position to understand something of the principle on which a condenser works. As its name suggests, its action is to condense the rays it receives from the luminant; but equally it is a collector, gathering up rays from the light which otherwise would be lost, or, at all events, uselessly dispersed. Except in toy lanterns the condensing system is never single but is always compound. Not only would the condenser, formed of a single lens, be too thick to stand the heat, but also its focus would not be of convenient length. By dividing the condenser into two parts not only will each lens be thinner and less likely to crack when greatly heated, but also the combined focus will be shorter, and by thus pemitting the lime to be brought nearer, a greater angle of light will be included. This matter will be referred to a little later on.

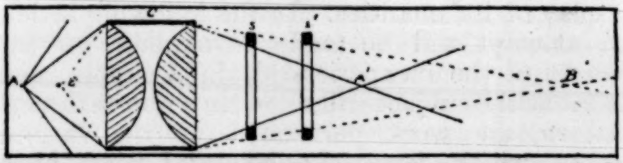
We will select for consideration the most ordinary form of condenser, known as the double plano-convex, and which may be roughly described as consisting of the two halves of a bi-convex, mounted together with the flat sides turned outwards. In the accompanying figure L is the luminant which we will suppose to be a point of light only, and not, as is the case with all kinds of limelight, an incandescent surface of considerable size. A is a wave of light from this luminant, advancing forward in a curve similar to a ripple formed by disturbing the surface of calm water. The centre arrow of the three having the greatest distance to travel through the denser medium of the glass is retarded most; the upper and lower arrows least; and, consequently, the rays, which are curved on entering the collecting element of the condenser, emerge in the straight line B, and are transmitted parallel on to the condenser proper. Here again the middle arrow denotes the part of the ray which will be most retarded, while the upper and lower ones have but a slight thickness to pass through, and so being out first, the ray assumes the curve marked C. Advancing in the direction indicated by the arrows, all parts of the ray meet simultaneously, at the point F, the posterior focus. This diagram, of course, neglects sundry important factors, but it will serve roughly to explain what takes place in a condenser.



If the front tube, or bellows, of the lantern be removed, experiment will show that the nearer L is moved towards the condenser the greater distance will F recede; a slight advance of the former producing a considerable lengthening of the latter. For every position of L there is a definite position of F, and pairs of points thus related to one another are known as conjugate foci. Since the objective, or front lens, is placed at F, it follows that the greater the distance between the condenser and the objective, the nearer the light must be placed to the former.

All lanternists are well aware that the same lenses which, with an oil lamp as luminant, only give poor definition, will, when lime-light is used, yield a much better result in this particular respect. If the luminant is a large one, such as an ordinary 3-wick lamp, we may consider it as consisting of a great number of luminous points (instead of, as with an ideal lime-light, a single one), each of which emits its own set of rays to the condenser, and which are duly condensed in cones to points on the other side of the condenser. These cones, being emitted by points which are separated from each other by sensible distances apart, cannot possibly coincide; the images formed will overlap each other, and consequently bad definition will result. To put the same matter another way—the light waves will not be truly spherical but will leave the condensing element in more or less irregular curves, incapable of being all transmitted to one single point.

Fig. II., in which the angles, &c., are exaggerated for the sake of making the diagram clearer, will explain still further the action of a condenser and the relation which the position of luminant has to the length of the front cone of light. If the lime be placed at A, the angle of light included by an ordinary plano-convex condenser at C will be about 50 degrees; and the point at which the convergent rays will cross be at A/. If the light be moved to the point B a trifle nearer the condenser, we shall find that the front cone is greatly extended and, as indicated by the dotted lines, will reach B/ before the rays cross. From the diagram it will also be seen that, as before mentioned, a greater angle of light is included when the lime is at B than when at A; and so there is a distinct gain in light by bringing the luminant nearer to the condenser.



On account of the great heat evolved there is a limit to the nearness with which a lime can be brought to the collecting lens. Allowing the condenser to warm up gradually, and by shielding it from sudden draughts and paying due attention to the lime, 2 inches may be considered quite safe with properly constructed lenses. By experiment with a small disc on a screen 8 feet or 9 feet from the lantern, the writer has found that with a 4 inch diameter condenser, consisting of a miniscus lens mounted close to a bi-convex, the actual measurement of these distances are:—With 4 inch back focus objective, lime to condenser, 3 inches; condenser to back lens of objective, 6½ inches; with an 8 inch focus objective, the distances are 2½ inches and 11 inches respectively.

For use with lime light the miniscus condenser mentioned above is preferable to the plano-convex, shown in Fig. II., but with an oil lamp it does not give the best results, and the ordinary plano-convex is more suitable.

A triple condenser is formed by inserting a third lens between the double condenser and the lime. This extra lens, which is generally miniscus in form but may be plano-convex, intercepts a greater angle of light than the ordinary commercial condenser. Theoretically a triple system should give superior results to those obtained from a double system, but, in practice, unless a triple condenser is scientifically designed and carefully constructed, and the conditions under which it is used very evenly balanced, it is an easy matter to fail to get improved results from it.

There is considerable diversity of opinion as to the most suitable diameter for a condenser. The size most generally in use is one of 4 inches in diameter; and for all-round work and for use with objectives of varying focus, it is by far the most suitable and efficient. A 4 inch lens will easily cover the whole of the working aperture of the ordinary-sized slide, while, on the other hand, unless the position of the slide be carefully adjusted, the use of a larger condenser than the size mentioned will often only result in a portion of light being wasted on the slide binding, the mask, or elsewhere. For producing the very best results it is imperative that the carrier stage shall be so fitted that it can be easily moved to or from the condenser in order that the whole of the front cone of light may pass through the slide. Reference to Fig. II., in which S and S' are two different positions of the slide, will explain this. The slide placed at S would be receiving the whole of the cone of light which comes to a point at A; but if placed at S' it would be too far from the condenser, and only the centre portion would be illuminated. In the case of the longer cone, indicated by the dotted lines, S would not be the most suitable place for a slide because a considerable portion of the light would be wasted on the mask and binding (the shaded portion); the correct place for the slide would be S', and if placed there it would receive the whole of the cone of light proceeding from the condenser. If a slide with a circular mask be placed close against the surface of a 4½ inch condenser nearly half of the effective rays of light will be wasted so far as the picture on the screen is concerned. Moreover, a larger diameter condenser necessarily means that its combined focus will be longer, and this, as we have seen, obliges the lime to be placed further away from the collecting element with a corresponding loss of light.

Here and there, for certain special purposes, condensers of 5 inches or more in diameter may be used; but for projecting slides a 4 inch condenser has the most advantages and the fewest drawbacks.

(*To be continued.*)

Incident and Fact.

A NOVEL OPENING TO A LATERN SHOW—A GOING CLOCK UPON THE SCREEN.

By Henry Burgess.

It was three o'clock on New Year's afternoon, 1894.

Sidney Morgan Heath, the eminent lanternist —it should be added, of the future, for it would be an injustice to associate that appellation to him in the present—sat in the luxuriant lounge, at the establishment in Regent Street, known as the "Cafe Royal," occasionally sipping what people are pleased to call, "Black Coffee," occasionally puffing at a "Larranaga," and occasionally reading, or pretending to read from a copy of *La France* because it is presumed it was the proper thing to do, and it looked big.

Morgan Heath, as he was more generally called, was a great man—in his own estimation be it said—with a good appearance, fairly well educated, was twenty-five years of age, his toilet and dress, *au fait*, and was talented in a marked degree—at least he had been told so—and, indeed, there can be little doubt of the fact, for had he not given, almost unaided, too, three fully-fledged lantern exhibitions, at each and all of which he had been assured by his young lady admirers present, that though they had heard the most popular entertainers of the oxy-hydrogen type, they *must* say the descriptive and declamatory powers of "Morgan Heath," outshone all of them, and a grand and deserved notoriety was in store for him. So that there was some little excuse for the young man's self-conceit.

This New Year's night was to chronicle the fourth success in the schoolroom adjacent to the Church that stands on Texley Hill. Personally he thought this would entirely outcap the previous ones, having made many additions to his pictorial *repertoire*, and, above all, his tutor, Richard Weatherlea, who was a capital fellow and a thoroughly experienced lanternist, had promised to act as operator on the present occasion.

"Dick," and "Morgan" had appointed to meet at the place and time mentioned, have a bit of lunch together, and go straight away to Texley Hill. Although "Weatherlea" was twenty years Morgan's senior, so much had they been together that the younger looked up to the elder who was his confidant and adviser, that they were as brothers; perhaps chums is the better word.

"What rubbish are you trying to wade through," said Weatherlea, catching *La France*, flag-fashion, on the end of his umbrella from over Morgan's shoulder.

"Hallo, Dick, my boy," said Morgan, "so glad you're here, a happy New Year to you, a thousand happy New Years; may you live to see all of them."

"Spare us good Lord," said Dick, with uplifted eyes, "Oh, my," he continued, "what a life; nothing to do but walk about while you're standing still."

"By-the-bye," remarked Morgan, "suppose we move into the corner over there we shall be all to ourselves, can have some port negus and a half-hour's chat before we feed."

"Port negus and a chat I'm agreed upon," returned Dick; "but my dear Sidney, I must draw the line at the corner, you know," he went on, "how I abhor corners. No, no, all sorts of rubbish goes into the corner and as a rule stops there. Then, again, Jack Horner was fond of the corner; a youth, to my way of thinking, greedy in the extreme. No, if any human soul ever wishes to put my name in his or her will, I pray that it may not be in the corner; it's likely to get torn off, you know; but let it be boldly engrossed in a prominent central position, so that there shall be no mistake about the reading, *and to Richard Weatherlea I do hereby bequeath, etc.*"

Five minutes later, port negus in hand, Dick Weatherlea caught the eye of his friend, and ejaculating as he raised his glass said, "To the health and future prosperity of Sidney Morgan Heath; may his name be ever welcomed by the people, and may they regard his abilities as the oxygen of their enjoyment."

"For the first time to my knowledge I indict you for gross flattery," said Morgan Heath, stroking a thin but well-trained moustache, and who nevertheless had happy thoughts of Dick's toast, and who continued the conversation with, "He only hoped that should he ever make a reputation, it should be as deserving of merit to the name of Heath as Dick's now was to the name of Weatherlea. But, Dick, I am anxious for your version of the uproarious night you had in 'Groomswick' last Tuesday." And he added, "According to the copy of the 'Midland Ringer,' you sent me, your reception was more warm than welcome. Oh, and the report goes on to say"—and here Morgan drew from his pocket the paper referred to and proceeded to read: "All this happened before the entertainment commenced. The storm was at its height when Mr. Weatherlea appeared upon the scene, who at once poured oil on the troubled waters, walking straight to the operator at the lanterns, a written notice was flashed upon the screen which read: 'The entertainment tonight commences punctually at eight, and the audience is respectfully requested to be perfectly silent when the clock before them strikes the hour.' A huge clock was projected upon the screen in true going order. It was five minutes to eight, 'It's going,' said one; 'Yes,' said another, 'I saw the hand move;' and at once the people, as if by magic, were seized on, and as the minute hand neared the hour a hushed silence reigned, while to the delight of all present, eight sonorous strokes upon the clock's gong told that time was up for us to start on our tour through 'British waters.' The last sound had not quite died away before a handsome proscenium was unrolled over the dial, and as quickly rolled up again, disclosing the first scene of one of the most enjoyable exhibitions it has ever been our pleasure to attend.'" Morgan Heath laid aside the paper, and with an air of deep curiosity interrogated his friend with, "Perhaps, old chap, you'll tell me as briefly as possible where in heaven's name you got the idea from—and the 'Magician's slide' from, I confess I have never heard of it, and should not have thought it possible. Oh, and what is meant by the uproarious gathering at the beginning of the report?"

"Sid, you amuse me," answered Dick, "but you're not the only lantern lover who's been both puzzled and delighted. I'll dispense with your last question first," continued Weatherlea, "as to the unruly audience; and this part of the business, my young friend, is an experience that only Father Time himself can furnish you with. You are fully aware, I hope, that audiences vary, as do temperatures, and that what may be called plain English in the south is all but Greek in the north. The circumspect you would naturally look for in St. James' over the way there, would not be tolerated in the rural districts of Somerset. The cotton varies from the mining as the mining varies from the fishing. Now Groomswick," continued Dick, growing with interest, "is a working population, and when the working people go in for enjoyment they, as a matter of fact, make enjoyment of it, and I say, quite right too. What do you think?"

"Quite right, Dick," remarked Sid.

"Well," proceeded Weatherlea, "last Tuesday was Fair day, so the folk as you may imagine were a bit jolly, and considering there had not been a lantern show in the town for sixteen months the hall in parts was uncomfortably crowded. In two or three places angry words were exchanged until, as the report says, we flashed on the notice slide and then the clock—which was highly relished—

and I at once got the people, as the saying goes, round my little finger. But the 'Midland Ringer' wanted something to ring about, and I can only compare the exaggeration to the famous story of the 'Cat Eater.'"

"What was that?" interrupted Morgan.

"Let me hurry on," said Weatherlea. "As to the idea and the slide I don't know what to say. However, I think I am treading upon pretty safe ground when I assert this novel opening to an entertainment emanates from Mr. Hepworth, of Polytechnic repute. I need scarcely say I was charmed when I heard of it, and felt determined to fish out if possible the inventor or maker of the arrangement."

"And you found him?" put in Morgan.

"Nothing of the kind, that's just what I didn't do. I tried to work the thing out myself, but to no purpose; when, all at once, I thought of my old schoolfellow, Rendle. I think, Sid, you met him at the Grange last summer."

"Oh, yes, I remember him, Weatherlea," remarked Morgan.

"I said to myself," resumed Dick, "the thing's done, and sent a telegram to say I should be up in the evening. Rendle was ready for me in his interesting den, where, as usual, he showed me something of everything. By-the-bye, time's playing the devil with Rendle's hair, and when I explained the principal object of my visit he was delighted. 'I'm not a horologist,' he said, 'but I think I can manage that. Of course, if I succeed, you are prepared to give the credit to Hepworth, for to him it belongs, not to me.' 'Most undoubtedly,' I answered. 'Very well. call up in a week and I'll think it out.'"

"Sidney, boy," broke out Weatherlea, "Would you like us to open with this effect to-night?"

"Have you really got it, Dick?" said Morgan.

"In my pocket," returned Weatherlea. And that gentleman drew from his pocket a small box containing the going clock. "Here, Sidney Morgan Heath," said Dick, "is to the best of my belief the first that has been made of the kind, and here," proceeded Dick, unfolding a sheet of foolscap, "is a brief description of a simple way of making it either for a single or double lantern. My old friend dotted it down at my request as I thought it would be of interest to the readers of the OPTICAL MAGIC LANTERN JOURNAL. Sid, I give you both the clock slide and script, as a New Year's gift."

"My dear Dick," exclaimed Morgan.

"I say, Fritz! Fritz! Fritz!"

"Yes, sir," said the waiter.

"Serve up, please."

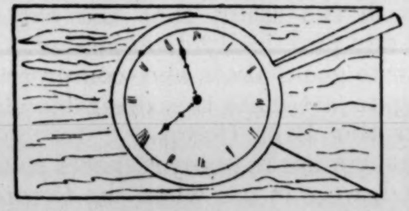
TO MAKE THE SLIDE.

The requirements for making a going clock slide are—A lever action carrier, a drill made of copper or brass for glass drilling, silver sand, turps, very thin flat brass, a foot of brass wire (thickness of a small hair pin), black needle paper, flat tins, &c., &c.

Take out screws at back of slide, remove slip and glass, cut a piece of tin exact size of square glass, and drill a hole in centre with a $\frac{1}{4}$ in. steel drill, and remove burr. Next make a drill from a piece of stick brass or copper. This must be turned on lathe to fit drill stock, but used on lathe, can remain in check. Turn outside straight, so that it just goes into hole of tin, face it flat, and mark centre with graver. Drill up about $\frac{3}{4}$ in. with a steel drill about two-thirds its thickness. It is in appearance a hollow tube.

Place the tins on the glass, and hold in position, so that drill goes into hole. Lubricate with turps and silver sand. Now commence drilling, using a very slow power. Much pressure must be avoided, and if a hand stock is used the glass must be placed on a soft pad. This is a tedious operation, and care is wanted when nearly through, or the drill will jump, and is likely to break the glass. When hole has been made it can be returned to the carrier, to mark round glass, from which, is to be drilled in the same manner.

The next stage is to mount a pair of hands to these glasses, which the writer advises to be made, as ordinary clock hands are much too thick and clumsy. The minute hand can measure about $1\frac{1}{2}$ in, and the hour hand $1\frac{1}{4}$ in. in length, and they can be cut from very thin sheet brass with a pair of shears. The pattern is immaterial. In the centre of boss of each of these a hole is to be made the same size as the holes in the glasses. A piece of very thin tube—the thinner the better—is to be fitted into the hole of each hand and soldered, to be afterwards filed down on fronts flat. The tube—or collet as it is called—must now be reduced, so that when put through hole it can only just be seen when looking down the glass. The figures of dial can now be painted on the square piece, first marking which is top, but if the reader is not capable of this it had better be put out to be done.



The diameter of the outside line of the dial should be $2\frac{15}{16}$ in. When painted it must be kept clean. Turn up a ring of brass wire to fit in circle of carrier. This need not be soldered at the joint. The slide can now be put together. Replace the square glass, figures inward, and screw in slip. Put the collet of the hour hand through the hole from the inside, and with a piece of boxwood chamfer it over on the outside, so that the hand can be turned as desired. Fix the minute hand in the same way, spring the wire into the circle, and replace lever. The wire coming between the glasses should prevent the hands touching. By removing the lever, the hands can be set to any hour. The minute hand will travel ten minutes.

About Gas Cylinders.

Mr. Kenneth S. Murray, in a paper given about a week ago before the Central Photographic Club, stated that "gas cylinders were first employed about a quarter of a century ago for the storage and transport of nitrous oxide and carbonic acid, and some years later the same cylinders were used for transporting oxygen and hydrogen gases for limelight and other purposes. They were large in diameter, heavy, and clumsy, and were made, I believe, from both lap and butt-welded iron tubing, and they had thick flat iron discs welded in at each end, into one of which the valve was fixed. I have seen many of these cylinders, and I have no doubt that, so long as the pressure of gas they contained was limited to fifty atmospheres, they were perfectly safe for use. Their great weight, however, for a comparatively small quantity of gas, made them very expensive and cumbersome as a means of transporting gases, and, consequently, with the development of the limelight, and the increasing demand for compressed oxygen and other gases, far better types of cylinders have in recent years come into the trade, with the result that the old iron ones have to-day practically disappeared. It would be unfair to gas-makers and compressors of old standing to attribute this desirable change entirely to the Brin Company, for good steel cylinders, similar in many respects to those now employed, were in use when the Company commenced business nearly eight years ago. It is undoubtedly, however, from that time that the rapid development of the trade dates, and the types and sizes of cylinders now supplied by the Brin Company have become recognised standards throughout the trade. Thus, without wishing to disparage in any way the work done by others, I may, I think, preface my description of the cylinders now employed by the Brin Company by saying that, to a great and almost general extent, the description applies to the cylinders employed throughout the compressed gas trade.

Cylinders are now made of mild steel, and they are either lap-welded or solid-drawn. The lap-welded cylinders are made from ordinary rolled and welded tubes, which are first cut to the length required and then welded up solid in a spherical shape, and finally swaged or drawn down at the other end on to a dove-tailed ferrule, which is screwed to receive the valve. Solid-drawn cylinders are either made from seamless tubing, which is cut to the length required and has the ends closed in exactly the same manner as in the case of lap-welded cylinders, or else they are made from a circular steel slab containing the requisite amount of metal to ultimately make the size of cylinder required. This latter is the type most popularly known as the solid-drawn cylinder. The slab is repeatedly heated, and pressed by hydraulic power on various mandrels, through dies, until the form is nearly obtained. It is then drawn cold to the finished size, and carefully annealed in order to restore the metal to its original state of ductility. In this way a tube open at one end, but closed spherically at the other, is obtained; and, finally, the neck is formed as in the case of the other cylinders.

This solid-drawn type of cylinder was first introduced by Mr. Howard Lane, of Birmingham, who has patented the process for manufacturing them. These patent rights were transferred in 1891 to the Endurance Tube and Vial Company, Limited, of Birmingham, and this Company, together with the firm of Samuel Walker, of Birmingham, to whom special rights have been granted, are, I believe, the only makers working under the Lane patents. To discuss the relative merits of types of these types of cylinders is to enter on somewhat delicate ground. It is claimed for the solid-drawn cylinder that the process of manufacture acts beneficially on the strength and homogenity of the metal; and it is found, from actual tests, that the ultimate tensile strength of the metal of a solid-drawn cylinder ranges from about twenty-nine to thirty-three tons per square inch, as compared with twenty-five to twenty-seven tons per square inch in the case of lap-welded cylinders. Solid-drawn cylinders are consequently made rather lighter in sections than the lap-welded, and in the smaller sizes have become undoubtedly more popular than the latter type. In the larger sizes each type of cylinder has its supporters, and, in point of fact, when they are proportioned so that the minimum thickness of the walls in each case is in accordance with the relative ultimate tensile strength of the metal, there is not much to choose between them.

All the cylinders used for the compressing companies are made to contain convenient quantities of gas at a pressure of 120 atmospheres, this being the standard filling pressure employed. Cylinders are made of all lengths, but their thickness varies only with their diameters and type. Thus the minimum sections now supplied by the companies are as follows :—

Inches.						Inches Thick.
4	external	diameter,	solid-drawn	type,	are	$\frac{5}{32}$
$5\frac{1}{2}$	,,	,,	,,	,,	,,	$\frac{7}{32}$
$5\frac{1}{2}$	,,	,,	lap-welded	,,	,,	$\frac{1}{4}$
7	,,	,,	solid-drawn	,,	,,	$\frac{9}{32}$

Good cylinders, of other diameters and thicknesses, are in use, but the above are the most popular, and the general tendency of the trade is to adopt these diameters exclusively.

As regards the ultimate strength of cylinders many tests have been made in order to ascertain their bursting point and elastic limit ; and, as they are now all constructed of nearly proportionate strength, the results may be generally summarised as follows :—

PRESSURE PER SQUARE INCH AT WHICH CYLINDERS BURST.

Lap-welded	$2\frac{1}{2}$	to	3 tons.
Solid-drawn	$2\frac{1}{2}$	,,	3 ,,
Expressed in atmospheres ..	373	,,	448

LIMIT OF ELASTICITY PER SQUARE INCH OF METAL.

Lap-welded	16	to	18 tons.
Solid-drawn	20	,,	23 ,,

ULTIMATE TENSILE STRENGTH PER SQUARE INCH OF METAL.

Lap-welded	25	to	27 tons.
Solid-drawn	26	,,	33 ,,

Having now briefly described the essential features in the construction of cylinders in use, I will turn to the point which is, after all, of most importance to lanternists, viz., the reliability of these cylinders for the transport of compressed gas.

I. With regard to the lap-welded type.

It has been raised, as an objection to these cylinders, that the fact of their being welded makes them less reliable than the solid-drawn or seamless type, and that the cylinder walls have to be thickened throughout in order to ensure the requisite ultimate strength in the weld, thus involving heavier cylinders. I will at once admit the accuracy of the latter portion of this argument. Lap-welded cylinders, fulfilling the conditions of strength I have already mentioned, must be slightly heavier than the solid-drawn of the same capacity, and it is in this respect that the solid-drawn or seamless cylinder can lay claim to superiority. During the last seven years I have seen many thousands of each type, and all these cylinders have been subjected by us to rigorous hydraulic and other tests. Some of these (and particularly in the early days, when cylinders were less uniform in size and thickness than they now are) have given way under these tests, and my experience is that, whereas the fracture in a solid-drawn cylinder is uncertain, that in the lap-welded is almost invariably at the weld. I feel almost confident that, had these latter burst under gas-pressure, instead of water, the only difference would have been that the tear in the weld would have extended further. The metal would still have remained all in one piece, and no serious damage would have been caused by the explosion.

Another important feature about a lap-welded cylinder is that the very fact of welding must ensure a mild and ductile quality of steel when the bottle leaves the maker's hands, so that there is no chance of a hard or brittle cylinder of this type getting into the market. There are two important reasons, therefore, why this very weld, which many people take exception to, should be regarded as a merit rather than a defect, viz :—

1. As it constitutes one longitudinal source of weakness throughout the entire length of the cylinder, it is much more likely, in the event of an explosion, to rip open in the seam, and thus cause little or no damage, than it is to fly to pieces.
2. The weld ensures a ductile quality of metal.

As evidence of the strength of lay-welded cylinders and their reliability for transporting gas, I have here to-night three cylinders of the standard sections and diameters already quoted. These cylinders are the property of our Scotch and Irish Oxygen Company, who have kindly lent them to me to show you. In March, 1890, these cylinders were subjected to some very severe tests, made with a view to ascertaining the amount of rough treatment which a cylinder of this type would stand without bursting. The tests were conducted in a pit at Stevenstown, near Glasgow.

Nos. 1 and 2 were charged with 120 atmospheres of oxygen in the usual way.

No. 3 was filled with liquified carbonic acid.

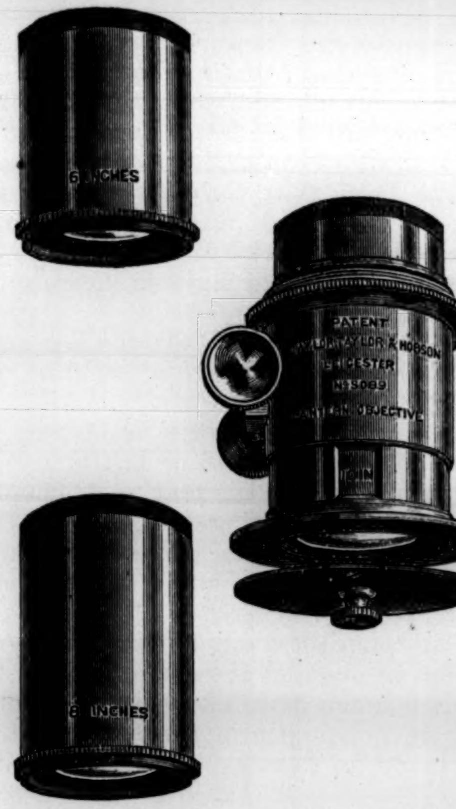
To be continued.

New Apparatus, etc.

—:o:—

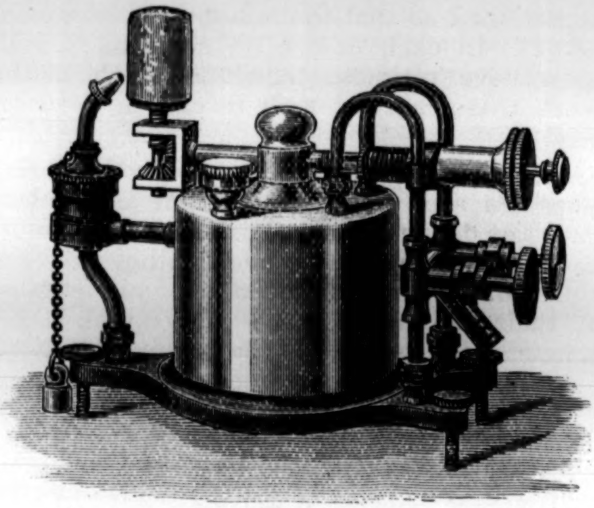
LANTERN "CASKET" LENSES.

Numerous lanternists are acquainted with the high-class lenses made by Messrs. Taylor, Taylor & Hobson, and will be glad to hear that this firm is now mounting lenses of different foci in draw tubes, each of which will fit into one jacket fitted with rack and pinion. The tubes are withdrawn by the action of the finger and thumb operating through two openings made in the jacket. The lenses are supplied in sets of 6, 8 and 10 in. focus, and are corrected for photographic use; they are a combination of Jena and best English glass.



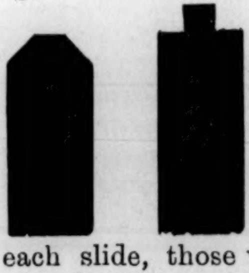
"GRIDIRON" SATURATOR.

Recently some valuable improvements have been made in connection with the arrangements for manipulating the lime cylinder used with this saturator, which enables all the movement to be controlled from behind. At the upper part of the back of the diagram will be seen a large knob with a small one coming from the centre of it. The rotation of the former controls the distance of the line from the jet, whilst by means of the latter the lime is turned.



WORMALD'S BINDERS.

Of late great attention has been bestowed upon binders for slides. One of the latest styles (introduced by Messrs. Wormald, of New Malden, S.W.) has the ends of the strips shaped as shown, so that the corners can be fastened with great security. Two strips of the form of each shown are used for each slide, those with the small tongue being placed on at opposite sides of the slide before the others with cut off corners are attached.



NAME TABLETS.

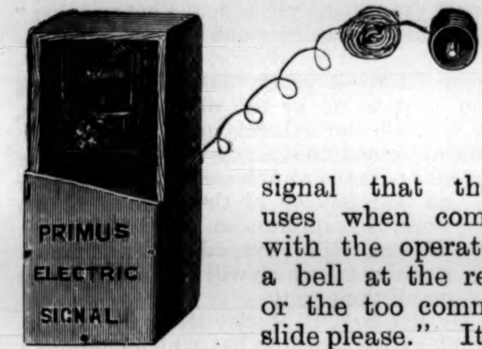
Convenient tablets for attaching to negatives or lantern slides are issued by Mr. W. Tylar, of Birmingham. They are put up in packets of twenty sheets, each sheet containing twenty-five labels numbered and gummed. As the packet of five hundred only costs sixpence no one can complain that they are expensive. The following shows the relative size of each label:—

No. 1
No. 2
No. 3

"NEWTONIAN LIMES."

These new limes, named after the firm who have introduced them Messrs. Newton & Co., of Fleet-street, are intensely luminous, and give a very white light. They are put up in tins without the usual lime packing and stand well. It is desirable that this lime be well heated before the full pressure of oxygen is turned on, so as to prevent cracking.

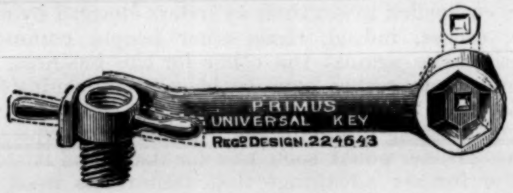
ELECTRIC SIGNAL.



Nothing is more annoying than for the audience to follow the signal that the lecturer uses when communicating with the operator, such as a bell at the reading desk or the too common "next slide please." It is a simple matter for all communications to be made quietly by electricity. To this end, Messrs. Butcher & Sons, of Blackheath, have brought out a lanternist's signal, it consists of battery, coil, and push pin. A code of signals is also provided.

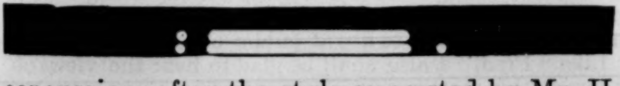
COMBINATION CYLINDER KEY.

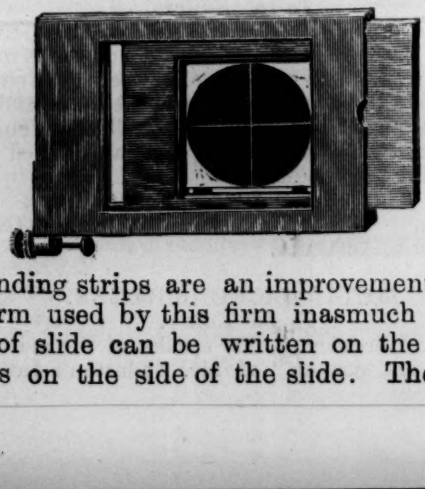
The same firm have also introduced a cylinder key which is provided with means for tightening wing nuts as shown in the illustration, the same instrument also acts as gland spanner and cylinder key.



CYLINDER PROTECTORS, &c.

Centreing carrier, tinters, and binders are also among the new things brought out by Messrs. Butcher. The protectors are thick rubber rings which are placed on the cylinders to prevent concussion, after the style suggested by Mr. H. P. Chandler, on page 19 of last issue. The tinters are made to fit the hood of lens and produce a very pleasing effect with plain slides.

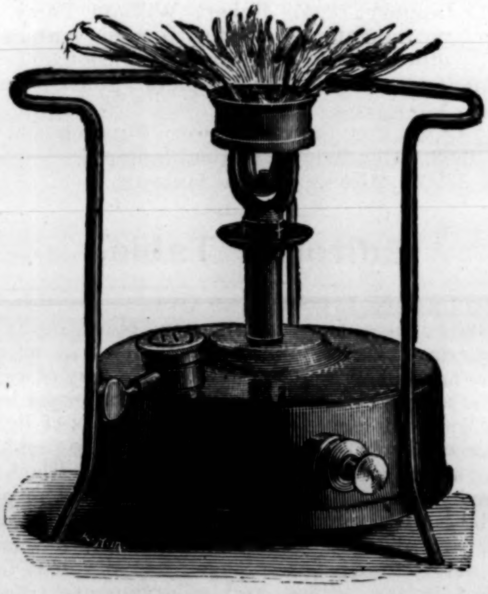




The binding strips are an improvement on the old form used by this firm inasmuch as the name of slide can be written on the edge as well as on the side of the slide. The carrier is well and accurately made, and is easily adjustable, so as to make the registration of unframed slides exact.

PETROLEUM LAMP STOVE.

During the late spell of cold weather it has not been uncommon for a magic lantern lamp to be used for heating a darkroom or other place where it is out of the question to have a fire, but as some lamps in the market give off an unpleasant and oily smell, and as all have a tall chimney which would cause them to be easily upset, a new form of lamp called the "primus" will be appreciated. This lamp burns oil gas, gives little light, no smell and great heat. Ordinary kerosene or petroleum is poured into the reservoir at the screw cap shown in sketch, and one charge will burn for about three hours. To light the lamp about a teaspoonful of methylated spirit is poured into the cup, midway between the reservoir and the burner and lighted. The flame from this heats the burner. Just before this spirit is burned out, air should be pumped on the top of the oil by two or three applications of the pump shown at side of reservoir. This causes the oil to be forced up to the hot tubes of the burner, when it is at once converted into gas which burns with an exceedingly hot flame. It will also be found useful and economical for a hundred-and-one domestic purposes. We tried it with a quart of cold water (34°) and found that it was brought to boiling point in exactly five minutes. These lamps which are of Swedish origin have lately been placed upon the English market and are being supplied to shops as quickly as possible by the wholesale agents, Messrs. Moeller & Condrup, of 78, Fore-street, E.C. They retail at 17s. 6d.



Patent Intelligence.

The following list, relating to current Patent Applications, is compiled expressly for "The Optical Magic Lantern Journal" by a registered Patent Agent. For further information apply to S. Dicker, "The Optical Magic Lantern Journal," 56, Chancery Lane, London, W.C.

RECENT PATENT APPLICATIONS.

158. 3 January, 1894. William Greenwood and Roughsedge Wallwork. Imrovements in lantern microscopes.

1024. 17 January, 1894. Benjamin John Malden. Improvements in chamber jets for oxy-hydrogen lime-light effects.‡

1035. 17 January, 1894. Frederick Woodward Branson. Improvements in the construction of safety boxes for the transport of compressed gas cylinders or other articles liable to suffer from concussion.‡

1091. 18 January, 1894. Franz Heinrich Klodt. Improvements in optical operations for producing magnified pictures or images in both horizontal and vertical directions.‡

1216. 19 January, 1894. Robert William Perry. Improvement connected with magic lanterns and other apparatus for optical illusions.

‡ Application filed with complete specification.

COMPLETE SPECIFICATION PRINTED.

4257 of 1893. Chadwick. Optical lanterns.
23756 of 1893. Allen. Optical lanterns.

:o:

Editorial Table.

"PHOTOGRAPHY, INDOORS AND OUT." — In this book Mr. A. Black, the author, after tracing photography from its early days gives minute particulars in everyday language as to the requirements in the way of camera and lens suitable to make good work in proper hands. The principles of lenses are given: methods of lighting in studios are dwelt on at length, as is also the problem of obtaining suitable lighting in private rooms. Flash light photography comes in for a share, whilst outdoor photography, both with stand and hand camera is well treated. Chapters are devoted to the dark room, developing, printing, etc. Some dozen pages are devoted to the making of lantern slides and enlargements. Various other subjects go to make up a book that will be found at once instructing, interesting, and devoid of all language that requires a person schooled in the subject to understand. In the preface the reader is assured that the author will not write $AlK(SO_4)_2 12H_2O$ when he means alum. The book contains 240 pages, and is published by Houghton, Miffin and Co., of Boston and New York. We have no advice as to the price at which the book is published, but would surmise that it was about a dollar.

"LES PROJECTIONS SCIENTIFIQUES," by H. Fourtier and A. Molteni (published by A. Molteni, 44, Rue du Chateau d'Eau, Paris), is a most useful book, dealing with scientific projections. The optical system of lanterns is given as a foundation for many of the interesting experiments which are explained throughout the book. Many subjects such as astigmatism and achromatism are dwelt on, the use of the polariscope is explained, and many illustrations given in connection therewith: Various experiments relative to persistence of vision are described. Altogether the reader will find about 280 pages of matter which cannot fail to interest unless he be totally ignorant of the French language, and even then he will find a great number of illustrations which—if we may use the term—speak for themselves.

"PRACTICAL PHOTOGRAPHER."—Our thanks are due to Messrs. Percy Lund & Co., of Bradford, for a bound volume of the past year of the "Practical Photographer," a monthly paper which contains much valuable information.

HILL & SONS' LIST.—A preliminary list of effect slides has been sent to us by the well-known artists, Messrs. Hill & Son, 13, Beversbrook-road, Tufnell Park, N. To one unaccustomed to the exceedingly high-class work, the prices may perhaps at first seem high, but after an examination of the fineness of the work, this impression will be changed. Messrs. Hill have adopted this professional mark which will in future appear on all their work.

PROFL. MARK.

HIRE LIST.—Mr. R. Clark, 31, Mosley-street, Newcastle-on-Tyne, has sent us his new hire list, which contains a large number of interesting sets of various classes of subjects.

:o:

Correspondence.

THE PRICE OF HYDROGEN WHEN COMPRESSED.

To the Editor.

SIR,—I agree with "Bombastes Triple" and "Fred" as to the high price charged for compressed hydrogen gas, but am afraid there is no remedy so long as lanternists are compelled to get their cylinders charged by other people, unless, indeed, those other people commence competing one against the other for this business. To my mind, there seems here to be a good opening for a manufacturer to put upon the market a small, portable hand compressing pump for gas. Unless very expensive, such an article would soon pay for itself, and it would have the further advantage that lanternists need not have more than one cylinder for coal gas, and that of quite medium size, certainly not larger than of twenty feet capacity, which, moreover, would usually not require being more than half-charged; just enough for the evening. A piece of india-rubber tubing would be sufficient to attach to the inlet of pump from the nearest gas bracket. A pressure gauge would of course be necessary.

Such a pump would enable many lanternists to avoid all need of using ether saturators, which, though they may be serviceable in practised hands, are deemed by many to be too risky to use at public entertainments.

Like "Fred," I also shall be glad to hear the views of others in this matter.

I am, Sir, yours faithfully,
Jan. 1st, 1894. HENRY.

SATURATORS IN AUSTRALIA.

To the Editor.

SIR.—The lantern is getting very popular here (Victoria); gas bags are not used at all, but tanks made of galvanised iron. The oxy-ether light being the only kind used, we use a three and four barrel saturator and make our gas as we want it during the exhibition. This gives no trouble and no waste of gas, and can be used in any of the country towns.

I remain, yours truly,
Hamilton, E. CLINCH.
Victoria, Australia.

METAL-FACED SCREENS.

To the Editor.

SIR,—Mr. Harrison (p. 12) speaks of the matt silver screen as "one portion" of Mr. Anderton's invention, and gives as the reason for its use the loss of light by the intervention of polariscopic elements.

I was under the impression that the matt silver screen was all that was original with Mr. Anderton, and that he used it in place of the ordinary screen, because the ordinary screen, owing to the nature of its material, depolarised the light.

I found this out myself nearly three years ago, when, after somewhat elaborate and expensive preparations, I tried the experiment in the lecture hall of the Franklin Institute, in the presence of Dr. Wahl, the secretary, and others. I find the following entry in my diary, under date of March 23rd, 1891: "Try lantern stereoscope with polarised light, and with coloured glasses. Polarised light is depolarised by substance of screen, and that method fails." I afterwards succeeded by projecting upon a sheet of glass finely ground on both sides, the image being viewed from the other side, but was not satisfied on account of restrictions as to size of image and convenience of operation."

Although I discussed my experiments freely with several friends, I did not publish them; but the same idea was published a few months after in England, by Prof. C. V. Boys, who even went so far as to propose the use of a screen having a matt metallic surface. I cannot give the reference to this publication, but I remember it very well, because it followed so closely upon my own experiments.

Very truly yours,
FRED. E. IVES.

116, Charing Cross-road, W.C., Jan. 8th, 1894.

LANTERN AND READING LAMP IN ONE.

To the Editor.

SIR,—I have used the new optimus lamp, which has a central hole for allowing air to reach the wicks. As many of your readers will know, this shaft is made through the oil reservoir. As the sides of the shafts are made of tin, they are good reflecting surfaces. To use this lamp it is necessary that a hole be made in the bottom of the lantern. The lantern is, in most cases, stood on the top of its case. Now, if a hole is made in the case to correspond to the hole in the lantern, users will find that they will obtain a good supply of light below. It only becomes necessary to make the inside of the box into a reading stand, when one will be able to obtain all the light that is necessary for reading a lecture or notes. Yours, etc.,

ONE WHO HAS TRIED IT.

THE ASKEW LANTERN BOX.

To the Editor.

SIR,—My attention has been directed to the advertisement on page 1,214 of this year's "British Journal Almanac" of a lantern box and stand, which the authors, Messrs. Sharp & Hitchmough, of Liverpool, declare they "devised about three years ago."

Good, Messrs. Sharp & Hitchmough!

But if this enterprising firm will turn up their correspondence of autumn, 1891, they will find an application from me, which I also addressed to over a dozen other firms, asking if they could supply a "portable lantern stand" to overcome the inconveniences of fixing up in the villages. It was because of the ridiculous replies I received (one firm I recollect could supply a tripod with top board for the modest sum of £3 15s.) that in "the last extremity of ills" I constructed a stand for myself.

This arrangement was patented in March, 1892, the exclusive right of manufacture being vested in Messrs. Newton & Co., Fleet-street.

It would now appear that Messrs. Sharp & Hitchmough, by a singular coincidence, happened to experience the same want at about the same, and by an equally singular coincidence, have brought out a box which presents about the same features as my own production, only with this trifling difference, that the new-comer has been extremely tardy in making its public appearance.

This stand, however, which has been hiding under a bushel for such a long time, is not very bashful now it has shown itself. True, the device for forming the box into a table and slide holder is absent, but otherwise the details are very well copied indeed.

As this is the second imitation I have seen, neither of which are quite near enough to be actionable, I suppose I must perforce console myself with being the object of that sincere form of flattery which imitation is said to imply.

Yours truly,
W. D. ASKEW.

Solon New-road,
Clapham, S.W.

METOL AND THE SKIN.

SIR,—There have lately been a good many reports circulated that metol affects the skin, and, as we are desirous of contradicting these reports, we beg to say that metol in solution will not attack the hands of the operator except when he omits to carefully wash his hands during and after use. Operators whose hands are easily irritated by reason of their very delicate skin should before using the solution first grease their hands with lanoline or vaseline, then rub them dry again to prevent any itching or other irritation. There is no doubt that any developer in solution will attack the skin if carelessly handled. On this point pyrogallic acid is by far the most poisonous chemical we know of, and is used at present, in spite of this, to a very large extent without rubber finger-stalls.

We can safely assert that metol in solution will attack the skin in exceptional cases only and where it is very delicate, this attack is usually produced by washing insufficiently. This is borne out by the few cases that have been mentioned during the last twelve months, during which time this developer has been in the market in this country. On the Continent no cases have been brought under the notice of our manufacturer.

Metol is steadily gaining favour with all classes of photographers, and we have no doubt that it will replace pyrogallic acid in course of time.

We shall feel obliged by your inserting this letter in your valuable paper, as we are desirous to safeguard the interests of our manufacturer.

We are, Your obedient servants,
FUERST BROTHERS.
(Sole Agents for Hauff's Developers.)

A GROWL ABOUT READINGS.

To the Editor.

SIR,—The letter in December by "Bombastes Triple" interested me much because of the utility and fairness of his remarks. It amused me too, for, said I, here is my *alter ego*; for like him, I am a great inventor, also under a cloud. Have not I invented, constructed and used the only stand by which an opaque screen with rail and roller can be got into position for use in less than 5 minutes? Have not I constructed the most rigid lantern stand yet used and which also forms a shelf for operator to stand his slides, etc.? Have I not also invented a shutter for Beard's Eclipse carrier which, by the action of the carrier automatically darkens the screen while slides are being changed, so that no movement is apparent on the screen? Have I not also nearly worked out the pattern of a central draught oil lamp (of course, too late), when I see one advertised by "Optimus"?

Now, sir, like "Bombastes," I think that all these fine ideas really entitle me to the privilege of a good grumble, and that is at the slides (set) which are on the market. The quality of slides is good enough, but it is the descriptive readings that are so wretched—as a general rule, long and dry.

There are a few good professional lanternists, a larger number of good operators, but most of these buy their slides and make their lecture. But are not the great bulk of lanternists amateurs, who use their lanterns or those of their societies, in a social, philanthropic or religious sphere of labour, and do not the greater number of these hire the slides as they want them? and as they do not see the readings when selecting, but only the list of slides, they generally find that, while they want about 45 minutes reading, they have got a good hour and a-half and no time to cut down, and upon one occasion, when I thought we were going to have a pleasant evening with a most interesting tale, I received a shilling book which would have taken about six hours to gabble through. Of course the result may be better imagined than described. I got over the difficulty last year by our dealer sending me a lot of readings in the summer, and I bought and kept those suitable for us. But this year we thought we would be up to date and have Horner's penny stories and the other latest sets. After a lot of bother and postage, I am informed that I can have one. I pay for the reading to be sent on, I get it just after our bills are out, and lo! a good two hours' reading, and we want it for a Band of Hope which should not exceed an hour and a quarter and must conclude with twenty or thirty comics and mechanical.

What is to be done? Cut it down; I worked at it for half a day, cut out entire chapters, including six slides, and now a racehorse could not get through it in less than seventy-five minutes. Of course the entertainment will be a failure. Now, sir, many vicars and other workers drop lantern evenings because of this worry. Why should it be so? Could not each slide publisher get out a volume for a shilling or so with all his tales? But, above all, when will they give us forty-minute good tales, readable, interesting and with about thirty slides or more. I believe, sir, that unless something is done a large number of amateurs who, like myself, use the lantern six or eight times a month for Band of Hope and village work, will get disgusted with the trouble and it will gradually die out in these quarters.

Thanking you for your kindness in allowing my little growl,

Yours truly,

PROFUNDO PETRO.

——:o:——

Notes and Queries.

A.L.T. asks for particulars as to where a fast tap and dies for cutting limes may be obtained?

Barnch writes: When using mixed jet, is it necessary that the regulators in both bottles must be of the same make, or can I employ a Duplex on one and a Beard's on the other? *Answer.*—It is not necessary that both should be of the same kind.

L. J. Skinner.—Use a piece of thin glass for the front; Messrs. Houghton, 89, High Holborn, keep some so thin that it is difficult to see it edgways.

R.Y.—The brass dial on printing frame is for tallying off the prints as made. Thus, if an order of six prints is required, place one hand at 6 and move the other one figure as each print is taken off.

W. Kenedy—(1) Dammar varnish is obtainable. You must use great care in rubbing. The paper-prints can only be used their own size, and cannot be reduced either by this means or that suggested by Mr. Wilkins in last issue. (2) You say "if this answer will appear in Journal, kindly send me a copy." We are happy to give all answers free of cost, but to send a copy of Journal containing answer, and pay postage, &c., is a little too one-sided an arrangement.

Geo. Beavan.—The Incandescent gas light has been used for lanterns. It has not sufficient penetrating power to be employed successfully in a large hall. You will find an article upon this subject in this journal for Dec., 1891.

John Stewart.—(1) We found the same effect with the limes mentioned, they act in the same manner with the other forms of jets you speak of. (2) If you call the attention of the makers to the "blinking," they will remedy it. It is possible that the packing is too solid.

F.F.W.—We have no reason to believe that the name the party goes under is not his proper name.

A. Tranter.—(1) We note article will be sent soon, (2) The rate of postage is 2 oz. for a halfpenny.

R. Vickers.—Either of the saturators mentioned, viz., "Gridiron," or Lawson, will answer your purpose.

Alpha.—The parcel of slides came to hand. They will be divided and sent as requested.

A. H. Saunders.—It is not wise to use the same regulator for both gases, one immediately after the other, but perhaps the one you saw on the bottle, although red, might have been kept for the oxygen only.

R. Moss.—(1) Lantern stands not unlike the one you speak of have been used, although they are only made to order. (2) We really do not think you can get anything for the idea; the screen elevator is a good one, but as you have used it, publicly without patenting it, we fear you have little chance of selling the idea. (3) We fail to understand your meaning with respect to the side-by-side lanterns.

Changing Slides.—Write to Messrs. Holmes and Watson, whose advt. will be found on another page. With the Matthews' lantern you can change the slide very rapidly, and it is even difficult for one of the audience to observe which direction the slide went off from the screen.

J. D. Conolly (Cleveland, U.S.A.).—We are not photographic dealers, consequently cannot supply you with the particular style of plates that you desire, and can only refer you to our advertising columns, where you will find just what you require.

C. E. Rendle.—Too late for this issue.

Geo. Kilburn.—In our next.

Perplexed.—Will publish your letter next time and will probably give a description of a method of adjusting stages.

J. Hoop r.—Use Japan varnish.

——:o:——

JUST

LOOK ON THIS AND THEN ON THAT.

The Rev. W. L. Watts, of Boxted Rectory, writes: "I must congratulate you warmly upon the success with which you have conducted the *Optical Magic Lantern Journal* from its beginning, and the great impetus you have thereby given to improvements in both lanterns and slides."

Mr. Alfred H. Saunders (slide artist), of Brierley Hill, writes: "The one insertion of my advertisement in the *Optical Magic Lantern Journal* has brought in more orders than my advertisement in ——— for fifteen months."